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Guichon & Cohen (2016). Authors' manuscript
Guichon, N. & Cohen, C. (2016). Multimodality and CALL. In Farr, F & Murray, L. (eds.). *The Routledge Handbook of Language Learning and Technology*. London: Routledge. pp. 509-521.

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ABSTRACT

This chapter explores the issues pertaining to multimodality, which has always been considered as a defining characteristic of CALL (Chapelle 2009). The chapter begins by critically examining the various definitions of multimodality, especially in the field of second language acquisition and cognitive psychology and explores the distinction between mode, modality and channel.
With reference to specific studies conducted in the field, we then investigate the potential of multimodality for second language comprehension and interaction. These studies support the idea that learning may be enhanced when teachers and learners have access to diverse modes. We also raise the question of cognitive load, especially crucial when information available in different modalities has to be processed, potentially leading to the division of attention between several channels.
To address the issue of multimodality in CALL, we take an overview of computer-mediated tasks and discuss the challenges identified by researchers. Because videoconferencing used for telecollaboration brings together different challenges posed by multimodality, we focus on what is at stake both for the teachers and the learners when they are interacting online with a desktop videoconferencing system. First, we explore the potential of multimodality for CALL. The last two sections are devoted to studying multimodality in CALL, first from the learners' perspective and the literacies that need to be developed, and second, from the language teachers' point of view, especially with regard to training them for current and future mediated teaching.

1. INTRODUCING MULTIMODALITY AS A DEFINING CHARACTERISTIC OF CALL

Any learning activity is multimodal by nature: language teachers in their classrooms use different semiotic resources (their voices, their gestures, sentences they write on the board, various documents or artefacts) to expose learners to the second language (L2) and involve them in meaning-making activities. Yet, the advent of the Internet and other multimedia technologies, the possibilities they provide to crucially 'integrate imagery, voice, sound, written text, and other semiotic modes' (Nelson 2006: 57), and the consequent changes in communication modes and conventions (Royce 2006: 366) create learning opportunities and have incited CALL researchers to envisage multimodality in a new light. Several researchers consider multimodality as a defining characteristic of CALL (see for instance Chapelle 2009). Indeed, Kress and Van Leeuwen have underlined the fundamental role technology plays in the semiotic process

'through the kinds of meaning which it facilitates or favours, and through the differential access to the means of production and reception which it provides' (1996: 233).

We propose to define **mode** as the type of semiotic representation (textual, aural and visual) used to present information. Jewitt (2009: 22) underlines that considering something as a mode requires 'a shared cultural sense of a set of semiotic resources'. **Modality** corresponds to the semiotic realisation of one mode; for instance the visual modality of videoconferencing is realised through the webcam image. Modalities are asynchronous when production occurs at a different moment from reception (as is the case when one participant writes a post on a blog and another participant reads it) whereas synchronicity corresponds to the simultaneity of production and reception as is the case when two partners interact using videoconferencing. Multimodality makes sensory information accessible in diverse semiotic modes and offers the opportunity to produce, comprehend and exchange information simultaneously through different channels (Guichon and McLornan 2008). **Channels** are part of what Mayer calls 'the human information processing system' (2005: 31), which allows individuals to process information via two channels, combining or dissociating visual and/or pictorial channels and auditory and/or verbal channels. Finally, **media** (e.g., video clips) are the technological means of inscription and production that shape the ways any message is conveyed and accessed. Thus, we propose to distinguish static, dynamic and interactive media (see Table 1), as these different types of dissemination and access seem to have an impact on the way information can be presented and understood. For instance, the dynamic feature of a video clip requires a different cognitive treatment from a static medium which can be accessed at leisure, as we will show in Section 3.

Table 1 provides three examples of learning media that will be used throughout this chapter in order to further our comprehension of multimodality and to investigate implications for language learning and teaching and for CALL design. The table also distinguishes between two types of temporality, whether the semiotic resources are proposed asynchronously or synchronously. For instance an online dictionary is a static medium in that it provides written content that remains unchanged on a webpage. The content of an online dictionary is realised through textual and visual modes and is processed via learner visual and verbal channels In contrast, a videoconference-based

exchange in L2 occurs synchronously and is interactive in that participants construct meaning in conjunction with each other in a unique and (mostly) improvised manner via textual mode (the written chat), aural mode (the voice of the interlocutor through the microphone) and visual modes (the image conveyed by the webcam).

TABLE 1 NEAR HERE

Temporality of the medium	Asynchronous		Synchronous
Nature of the medium	Static	Dynamic	Interactive
Examples of learning media	An online dictionary for children	A captioned video clip inserted in a learning environment	A conversation in L2 via a videoconferencing tool
Semiotic modes	Textual (written definitions) and visual (accompanying illustrations)	Textual (subtitles), aural (reporter's voice, interviews), visual (video images)	Textual (textchat), aural (interlocutors' voices), visual (interlocutors' images)
Channels	Visual/pictorial and/or auditory/verbal		

Table 1: Modes and media in different temporalities

As appears clearly with these examples, several modes are generally combined to represent the meaning of a message, for instance the meaning conveyed by a video clip is distributed across the video image, the voice of the journalist and the written information. Yet, as Jewitt (2009: 25) insists, 'the different aspects of meaning are carried in different ways by each of the modes in the ensemble. Any one mode in that ensemble is carrying a part of the message only: each mode is therefore partial in relation to the whole of the meaning'.

In sum, multimodality depends on (1) the variety of modes made available to present a piece of information and (2) the interactivity between the different modes, that is whether they are presented separately or are fully integrated. We contend that multimodality provides affordances for language learning, that is 'possibilities for action that yield opportunities for engagement and participation that can stimulate intersubjectivity, joint attention, and various kinds of linguistic commentary' (Van Lier

2004: 81). To present a document across several modes is, for instance, an affordance of multimedia. Knowledge about multimodality should then be of prime importance for CALL practitioners because they have the responsibility of choosing how to present and organise learning situations and need thus to know the potential and the limits of multimodality in order to maximise learning (Stockwell 2010). Without such knowledge, as Lamy cautions, we run the risk of 'missing out on explaining the nuances in the learning process' (2012: 121) and, as a result, may fail to take full advantage of the learning possibilities. Besides, the pervasiveness of multimodality in L2 learning entails developing new pedagogies that take into account the 'variety of text forms associated with information and multimedia technologies,' as well as the 'proliferation of communication channels and media [which] supports and extends cultural and subcultural diversity' (the New London Group 2000: 9).

2. THE POTENTIAL OF MULTIMODALITY FOR CALL

In this section, we take a closer look at what is at stake with multimodality and how multimodal technologies may contribute to second language learning. It is important to emphasise that investigation in this domain is still in its infancy, resulting in 'a lack of research that examines the impact of th[e]combined use of tools on interaction and analyses multimodal communication in an online language classroom' (Hampel and Stickler 2012: 118-9).

Let us first consider certain key characteristics of multimodality. Kress and Van Leeuwen state that multimodality is 'the use of several semiotic modes in the design of a semiotic product or event, together with the particular way in which these modes are combined – they may for instance reinforce each other […], fulfil complementary roles […] or be hierarchically ordered' (2001: 20). So there may be redundancy or complementarity between the different modes. In the former case, the same information is repeated across several modes. For example, in an online dictionary, a lexical item can be provided in a textual mode (its graphic representation), an aural mode (its pronunciation) and a visual mode (a picture), thus creating a redundancy effect (see Section 3) between the three semiotic representations. In the latter case, a complex piece of information, for instance a video clip inserted into a learning environment, can be conveyed by different modes, thus creating a multimodal text in which, at any given

moment, one mode may carry one set of meanings (for instance a clip showing images of Washington DC monuments providing contextual elements) while another mode carries another set of meanings (a self-employed woman explaining how hard it is to raise a child in the US). Both modes give different but complementary information and provide learners with a 'rich multimodal learning experience' (Collentine 2009: 79).

Yet Kress and Van Leeuwen insist that visual and verbal media 'are not simply alternative means of representing the same thing' (1996: 76) but rather multimodality involves not only accessing information in different formats but also establishing interactivity between the various representations. Levine and Scollon (2004) consider multimodality to be a dynamic meaning making process which is inseparable from the notion of interaction. Indeed, it is precisely the enriched interactional opportunities offered by the multimodal nature of technology-mediated environments, which are thought to provide enhanced opportunities for second language learning. This will now be illustrated, considering first, studies conducted with asynchronous static or dynamic media, then with synchronous interactive media.

Several studies carried out in static or dynamic media have shown that learning opportunities are enhanced when information is presented in more than one representational code. For example, Mayer and Anderson (1992) showed that learners were better able to understand how a bicycle pump worked when the information provided included both a written text and an animation, rather than a written text alone. Likewise, in a study investigating how multimedia annotations impact on the acquisition of second language vocabulary, Chun and Plass (1996) demonstrated that accompanying definitions by images fostered learning. So learners understand better when they are able to integrate visual and verbal representations because these are qualitatively different and are therefore complementary (Mayer 2005). Schnotz sheds further light on this question, insisting that having access to words and pictures may improve the potential for learning, but only on condition that 'the words and pictures are semantically related to each other (the coherence condition) and if they are presented closely together in space and time (the contiguity condition)' (2005: 60).

In the wake of the many telecollaborative projects that partner up learners from two different cultures and languages (cf. Guth and Helm, 2010), there is a small but increasing number of studies which investigate how multimodality may foster language learning in synchronous interactive media (e.g. Blake, 2005; Ciekanski and Chanier, 2008; Hampel and Stickler 2012). We will first consider studies carried out in audiographic then videoconferencing environments.

In a study conducted in an audiographic environment, which included voice and text chat and a shared word processing function, Blake (2005) posits that it was the complementarity of the voice and text chat modalities which favoured negotiation of meaning. Indeed, the tutor and learners made strategic use of the multimodality of the environment to further the interaction, with the tutor frequently reinforcing in the text chat what had been expressed in the voice chat and the learner choosing the less face-threatening text chat over the voice chat to request linguistic assistance from the tutor. Ciekanski and Chanier (2008) highlight how working in a multimodal audiographic environment can encourage collaboration between learners. In their study, in which learners do a shared writing task, combining the audio and text modes is shown to enhance the learning process as participants focus on the writing process itself in order to make meaning.

In a videoconferencing environment which included linguistic (voice and text chat and a shared whiteboard), visual (icons, still and moving images) and gestural (via a webcam) elements, Hampel and Stickler (2012) show how teachers and learners combine the different modes which offer a wider range of possibilities to make meaning through a range of discourse functions (e.g. asking for clarification, requesting or providing lexical elements, agreeing and disagreeing, providing feedback). They observe that 'These functions are central for learning in all subjects, but they are particularly crucial in language learning where negotiation of meaning […] has been shown to contribute to second language acquisition' (2012: 121).

The aforementioned studies also illustrate the benefits of synchronous interactive learning environments for accommodating individual differences and modal

preferences. Individualising learning in this way supports interaction and increases the possibilities for language learning, as learners progressively develop strategies enabling them to take advantage of the different potentialities offered by the various modes, appropriate the tools at their disposal and adapt them to their own objectives.

So to sum up, the studies discussed in this section offer support to the idea that providing teachers and learners with diverse modes to make meaning may enhance language learning. The different modes available in synchronous interactive environments are interrelated and the learning opportunities offered will depend on how users choose to combine or dissociate the different modes. Hampel and Stickler argue that these media rich learning environments allow for 'a combination of different modes and multiple parallel representations' (2012: 134) and that this combination increases what Norris has referred to as 'modal density' (2004: 103), defined as the intricate interplay of different communication modes or the intensity of one particular mode used by a social actor. However, we are still some way off understanding the complexity of multimodal perspectives (Jewitt, 2011) and further empirical studies are clearly needed to identify the possibilities and limitations of multimodality for computer assisted language learning.

3. ISSUES RAISED BY MULTIMODALITY IN CALL: COGNITIVE COST AND POLYFOCALITY OF ATTENTION

In this section, we will summarise findings from the field of cognitive psychology of which language educators need to be aware in order to have a better understanding of the challenges posed by multimodality to learners.

If multimodality is generally seen as a potential for language learning (see above), it nevertheless raises questions pertaining to the attention that is required from learners to process information provided in different modes. Not only is attention 'a resource of limited availability' (Wickens 1984: 15) but each channel (i.e., either visual/pictorial or auditory/verbal) involved in processing information is itself limited (Mayer 2005). When two modes are in competition, for instance a text accompanied by an oral message, the amount of time needed to switch between them is longer than the time

required to process information within a single one. Besides, there is a cognitive bias, referred to as 'visual dominance', whereby humans generally prefer processing visual information (Wickens 1984: 253).

Cognitive psychologists have studied what multimodality involves in terms of cognition and have provided useful results for the field of CALL. Several effects have been identified. These are the modality effect, the split attention effect and the redundancy effect.

According to Sweller (2005), **the modality effect** occurs in conditions where multiple information sources are crucial for understanding and learning and where the visual information provided requires learners to divide their attention between them. In the domain of language learning, this effect was investigated by Guichon and McLornan (2008). The study assessed the treatment of the same document by intermediate level French learners of English but in different conditions (audio only, video only, video + subtitles in English, video + subtitles in French). Their findings showed that comprehension was enhanced when information was presented as richly as possible. However, it also provided evidence that when visual information was not directly related to the oral message (e.g., when images were unconnected to the reporter's oral comments), there appeared to be a cognitive overload. They further suggested that visual information which was not directly linked to the auditory information may distract learners' attention and create a split-attention effect. Thus, exposure to simultaneous but different information carries a cognitive cost which is sometimes too high for learners, creating processing difficulties (Moreno and Mayer 1999).

Sweller has underlined the **split attention effect** that may occur when individuals have to divide their attention 'between multiple sources of visual information [e.g., written text and pictures] that are all essential for understanding' (2005: 26). Mental integration of these multiple sources is required before comprehension and learning can take place, putting a substantial cognitive load on the processing capacities required to carry out this operation. Thus, reading an explicatory text while looking at the illustrations that

accompany it may cause an overload of the visual channel and impinge on comprehension performances (Tricot 2007).

The **redundancy effect** (see Sweller 2005; Wickens 1984) is a somewhat different phenomenon and some researchers have noted its rather counterintuitive nature 'because most people think that the presentation of the same information, in a somewhat different way, will have a neutral or even positive effect on learning' (van Merriënboer and Kester 2005: 82). If the same piece of information is reiterated across several modes, when one source would be sufficient for comprehension and learning, there is redundancy between the different sources. Indeed, having to pay attention to several sources, in order to verify whether a given piece of information is identical, carries an unnecessary cognitive cost. Creating redundancy between two sources is only beneficial if learners have low prior knowledge of a notion. An example to illustrate this (see Table 1) is an online dictionary for children in which there is a word, such as *saxophone*, which is accompanied by a simple definition and an image showing the musical instrument. On the other hand, when learners have high prior knowledge, one source is sufficient to provide the required information for understanding. In the case of a text reiterated by an illustration, 'the eye wanders between the two sources […], the learner loses time and mental effort with the search for redundant information' (Schnotz 2005: 63), and this has a negative impact on learning.

From all these results concerning the effects of multimodality on learning, the following elements can be underlined:
(1). Providing information from different sources usually carries an extra cognitive load, but can nevertheless facilitate comprehension and learning. Yet, educators might want to be wary of providing seductive but irrelevant information, which might cause cognitive overload and end up interfering with learning (Clark and Feldon 2005). Furthermore, creating redundancy between several modes can be detrimental when learners have good prior knowledge of a notion.

(2). Multimodality can have a scaffolding effect, for instance when subtitles are provided in a video clip. Yet, if subtitles facilitate comprehension (see Baltova 1999),

they can also prove to be distracting in that they load on to reading skills and use a cue that would not be present in a real-life situation.

(3). The cognitive treatment is different in a static medium such as an online dictionary for children (see Table 1) in which learners have time to go from one source to the other, compared to dynamic or interactive media which puts more pressure on learners, obliging them to switch rapidly from one channel to another in a limited time and integrate the different pieces of information into a single representation. Thus, when possible, giving learners control over the delivery allows them to interrupt the flow of the input and thus avoid cognitive overload. This principle, that some researchers have called 'the self-pacing principle', posits that 'giving learners control over the pace of the instruction may facilitate elaboration and deep processing of information' (van Merriënboer and Kester 2005: 83). Multimodal competence thus entails developing metacognitive strategies necessary for 'allocating, monitoring, coordinating, and adjusting […] limited cognitive resources' (Mayer 2005: 36) when dealing with mediated learning situations.

(4). As Ciekanski and Chanier (2008) have remarked, multimodality does not only concern the way a technology-mediated learning activity is presented but also refers to the dynamic process of meaning-making that is involved when learners have to deal with technology-mediated interactions. Thus, the dynamic character of Computer Mediated Communication (CMC) in language learning adds a new dimension to the allocation of attentional resources. In a web-mediated interaction, not only do learners have to pay attention to their interlocutors' multimodal messages (text chat, voice chat, webcam image), but they also have to divide their attention between several tasks (e.g., using the keyboard, checking the webcam image, accessing various documents) in what Scollon *et al.* have called the 'polyfocality of attention' (1999: 35). Jones goes as far as to say that polyfocality seems 'to be part of the very ethos of new communication technologies' (2004: 27). Thus, interacting online, for instance via videoconferencing, means that learners have to handle communication across several modes and switch quickly between the verbal and visual modes to participate fully in the exchange while

they are engaged in simultaneous – and sometimes competing – tasks (Guichon, Bétrancourt and Prié 2012).

4. DEVELOPING LEARNERS' MULTIMODAL COMPETENCE

This section explores the question of new literacies that can be developed among learners to help them deal with mediated learning situations with appropriate competence. Erstad (2011) lists several key literacies, which need to be developed by individuals working in digital environments. The following are particularly useful in the context of multimodal language learning situations:

- the ability to communicate using different meditational means;
- the ability to cooperate in net-based interactions;
- the ability to create different forms of information such as web pages.

Kress (2003) has proposed the concept of **multimodal competence** and this has been further defined by the New Media Consortium as 'the ability to understand and use the power of images and sounds, to manipulate and transform digital media, to distribute them pervasively, and to easily adapt them to new forms' (2005: 2). Some authors have advocated the need to focus on **multimodal literacy** (Fuchs, Hauck and Muller-Hartmann 2012; Royce 2006), arguing that multimodality and its different semiotic realisations constitute a set of options from which a learner can choose in order to make meaning. For instance, Royce (2006) set up a digital storytelling project requiring learners of English to create multimedia narratives and integrate different multimodal elements (pictures, audio recordings, texts) for a writing composition class over several months. Nelson concludes that such projects, which incite learners to reflect upon the different possibilities of making meaning by combining different verbal and non verbal means, could be useful in developing multimodal competence and multimodal literacy as defined above.

Experts working in the field have identified three types of skill that language learners need to acquire to work effectively in multimodal interactive situations. These are semio-pragmatic, psycho-cognitive and socio-cultural skills.

With regard to **semio-pragmatic skills**, it is important for learners to go beyond their individual modal habits and preferences, so that they can use two or more modes concurrently for meaning making. Furthermore, they need to acquire a critical use of the different modes in order to 'familiarise themselves with the 'grammar' of other modes such as the visual' (Hampel and Hauck 2006: 12). So they will need to become skilled not just in switching linguistic codes, but also in switching semiotic modes. In addition, they need to acquire skills in a range of new codes, including online speech, writing and image (Fuchs, Hauck and Muller-Hartmann 2012).

Learners need to develop **psycho-cognitive skills** too. Indeed, working with unfamiliar tools in multimodal CMC language learning spaces may make strong affective demands on certain learners, potentially compromising the learning process. This can result in a lack of motivation, as well as computer or language anxiety and cognitive overload (Fuchs, Hauck and Muller-Hartmann 2012; Hampel and Hauck 2006).

Finally, it is important for learners to develop **socio-cultural skills** in order to be able to deal with intercultural differences when communicating in virtual multimodal learning spaces (Fuchs, Hauck and Muller-Hartmann 2012). Hampel and Hauck emphasise the importance for learners to acquire intercultural awareness because '[M]odes, making meaning and communicating are influenced by cultural conventions' (2006: 13).

So how can teachers help to prepare learners to develop their multimodal competence? It is often assumed that today's users are able to apply their everyday knowledge of and familiarity with technology to multimodal CMC language learning situations. However, several recent studies (see Hubbard 2013) reveal this assumption to be imprecise for many learners who do in fact require targeted training to attain 'the level of readiness needed for effective use of technology in language learning tasks and activities' (Hubbard 2013: 166).

We make several recommendations concerning how language learners may be trained to function effectively in CMC environments, in order to acquire the necessary skills discussed above. First, to develop semio-pragmatic skills, it is advisable to allow

learners to familiarise themselves with the different tools in the multimodal learning environment, by exchanging first in their L1 with their peers in less challenging and stressful conditions, before starting to exchange in the L2 (Guth and Helm 2010). Familiarising the learners with the tools also includes sensitising them to the different affordances offered by CMC environments. Knowledge of these is crucial for the development of effective multimodal competence and should form an integral part of learner training. Besides, learners should be made aware that the structure of the multimodal digital learning environment will 'shape the affordances of the tool and mediate the interaction between participants' (Hampel and Stickler 2012: 133). So, for example, in an audiographic environment, not having access to the interlocutor's image (gestures, facial expressions, etc., via a webcam) which can enhance meaning making may lead to increased anxiety in certain learners, affecting their participation and performance. Similarly, in a CMC environment which includes text chat, learners may behave differently when their written contributions are visible to all participants, from when they have the possibility of sending private messages, thereby modifying the interaction (Hampel and Stickler 2012).

Since the CMC learning environment is complex, it is important for learners to discover the various tools progressively, perhaps by adding a new mode at each step in order to allow learners to gain a critical understanding of the purpose of each mode and how several modes can be orchestrated (Guth and Helm 2010). For instance, it could be useful to point out to learners that, in a synchronous interactive mode, text chat can be used to ask for clarification or to comment on what somebody says, to avoid interrupting the flow of the online conversation in the voice chat (cf. Develotte, Guichon and Kern 2008). In addition, to help learners adapt to the multimodal environment, it could be helpful to allow them to mute one mode to the benefit of another, and then progressively learn to manage different sources and different channels concurrently.

Moreover, having a progressive introduction to new skills and knowledge should ease the affective demands made on learners by multimodal learning spaces, consequently reducing computer and language anxiety and cognitive overload. Organising

collaborative group debriefing sessions in which learners share their experiences may be helpful too, not only to reduce affective demands, but also to promote reflective and critical thinking and reasoning (Hubbard 2004). Raising learners' awareness of their individual learning styles and strategies can contribute to their degree of success when working in CMC environments, with a particular emphasis on 'the metalinguistic and metacognitive side, to assist them in maximizing their use of this technology' (Hoven 2006: 251). Indeed, matching students' modal preference to the instructional modality has been shown to contribute to successful language learning (Plass *et al.* 1998).

Mayer (2005), the cognitive psychologist (see Section 3), has underlined the necessity of providing guidance in how to process the information presented – that is, determining what to pay attention to, how to organise it mentally, and how to relate it to prior knowledge. The teacher acts then as a sort of cognitive guide who 'provides needed guidance to support the learner's cognitive processing' (Mayer 2005: 12). Fischer argues that CMC training 'entails not only guiding learners to make good pedagogical decisions to facilitate their learning, but also instructing them how to use technological resources in support of those pedagogical decisions' (2012: 28).

With regard to the development of socio-cultural skills, Sadler encourages instructors to raise students' awareness of cultural conventions of CMC, including 'basic information about ways to hold the floor in synchronous communication and ways to ensure successful asynchronous collaboration', as well as 'a cross-cultural analysis of communication conventions for the participants' (2007: 26). In addition, familiarising learners with nonverbal elements of communication is crucial for enhancing their cultural sensitivity and awareness.

In sum, learners need to develop their multimodal competence by gaining a set of skills to work effectively in interactive language learning spaces. Acquiring these semio-pragmatic, psycho-cognitive and socio-cultural skills requires training to enable learners to adapt progressively, so that they may benefit from the multimodality of the environment and maximise their learning possibilities.

5. TEACHING IMPLICATIONS: DEVELOPING SEMIO-PEDAGOGICAL COMPETENCE

In Section 4, we saw that the current digital era requires language learners to be equipped to manage static, dynamic and interactive technology-mediated situations, devise strategies to cope with cognitive load and make culturally-aware use of multimodality in order to become 'multimodally competent' in meaning-making, be it in reception, production or interaction. In this concluding section, we will advocate the need to develop new teaching skills among language teachers in order to take into account the specificities of multimodality.

We propose to use the term **semio-pedagogical competence** (Develotte, Guichon and Vincent 2010; Guichon 2013) to refer to teachers' awareness of the semiotic affordances of media and modes and their subsequent ability to design appropriate technology-mediated tasks for language learning. This competence relates to the interfacing role of language teachers who have to learn to use the communication tools (forums, blogs, videoconferencing facilities, etc.) that are the most appropriate for the learning scenarios they propose, and to manage the ensuing interactions with the most adequate modes (textual, aural and/or visual communication, synchronous and/or asynchronous). Building on the previous sections of this chapter, Table 2 summarises the main characteristics of semio-pedagogical competence under three headings – media assessment, mode assessment and task design.

TABLE 2 NEAR HERE

Media assessment	The capacity to assess the affordances of each medium in terms of its potential for language learning
Mode assessment	The capacity to assess the cognitive demands of each mode on learners and to adjust them according to the pedagogical objectives
Task design	The capacity to design tasks that provide for: - the processing of information either in one mode or in several modes - learner control and progressive discovery - culturally-based use of multimodality

Table 2: Semio-pedagogical competence

As Jewitt has pointed out, 'understanding the semiotic affordances of medium and mode is one way of seeing how technologies shape the learner, and the learning environment, and what it is that is to be learned' (2004: 194). Just as language teachers have to become competent in assessing the level of complexity of documents to adjust their length or the guidance they provide, they also need to develop the overarching competence of knowing what medium or what combination of media will be appropriate for given pedagogical objectives.

In line with research in cognitive psychology (see Section 3), language teachers also need to be aware of the cost of multimodality and polyfocality. Through the ambient discourses on digital natives, teachers are led to believe that learners who have always had computers in their environment and who participate regularly in online exchanges for social purposes are naturally equipped for language learning in CMC environments. Contrary to these misconceptions, teachers have to ensure that the modal density (Norris 2004) of each technology-mediated teaching situation they design does not exceed their learners' cognitive capacities while giving the learners the possibility to extend their multimodal competence (Hampel and Hauck 2006).

Following Tricot (2007), we can also recommend that teachers learn to assess the pertinence of any given technology-mediated situation and anticipate its learning cost by describing minutely the relationship between the media that are used, the mode(s) that will be harnessed by the learners and the expected learning outcomes. As Mayer has underlined, 'multimedia designs that are consistent with the way the human mind works are more effective in fostering learning than those that are not' (2005: 9).

Finally, in terms of task design, teachers should acquire the necessary skills to organise learner use of multimodality on the following continua:

- from one mode to a combination of modes;
- from static, to dynamic to interactive media;
- from little to total control over the use of modes;
- from familiar to less familiar cultural codes;

thus adjusting task design to the different parameters of multimedia and multimodality, learner needs and pedagogical objectives.

From our experience in teacher training, it appears crucial that teachers develop this semio-pedagogical competence through hands-on experience of multimodality as advocated by Lewis (2006). The latter engaged in a gradual discovery of an audiographic environment at the Open University (UK) and said several weeks were needed to overcome 'feelings of stress, bewilderment, and inadequacy' (2006: 595) before feeling 'at home with multimodality' (2006: 595). Another example of how such experiential teacher training is being provided is through an ongoing telecollaborative project between Irish undergraduate learners of French and student teachers enrolled in a Master's degree in French as a foreign language in France. In this project the student teachers have to prepare and administer weekly 40-minute sessions via a desktop videoconferencing system over six weeks. The day after each online session, the student teachers analyse their own teaching performance in a group debriefing session led by a teacher trainer, using the multimodal traces of the interactions (composed of text chat messages and videos of both sets of participants) that have been stored on the system's server (Guichon 2013).

This technology-mediated situation combines four elements which are at the far end of the aforementioned continua: it combines several modes, is highly interactive, is controlled by the participants, and necessitates cultural awareness (e.g., understanding the different meanings attached to certain gestures across cultures). By engaging student teachers in such a technology-mediated situation, this telecollaboration project provides the opportunity to develop their semio-pedagogical competence. Indeed, student teachers have to adapt and develop their existing pedagogical competence to fit the demands of a situation where multimodality and its different components can be experienced. At the same time, the various pedagogical resources can be deployed progressively and, may then be reinvested in future off- or online teaching situations. If technical skills are not necessarily transferable from one teaching environment to another, we contend that critical semiotic awareness developed through this type of

experiential teacher training programme can be valuable for dealing with multimodality in future language teaching situations.

This chapter has highlighted the centrality of multimodality for CALL. Although further research is clearly needed to identify the potential and limitations of multimodality for CALL, existing studies already suggest that giving learners access to a range of modes for meaning making may enhance language learning. Yet, research has also shown that multimodality may pose cognitive challenges to L2 learners in terms of the attentional resources that are required to process multimodal information. Not only do learners need to acquire a certain number of skills to take full advantage of the multiple learning opportunities offered by the digital environments, but language teachers have to develop specific competences to harness multimodality and make the most of its potential for language learning.

6. FURTHER READING

- Hampel and Stickler (2012)

This article focuses on how videoconferencing interactions are influenced by the affordances of the online environment. Analyses of written and spoken interactions reveal how multiple modes are used and combined by learners to make meaning. Furthermore, the study shows how teachers and learners gradually adapt to the multimodal environment, leading to the emergence of new interactional patterns.

- Jewitt (2011)

In this chapter, Jewitt explains how the pedagogic landscape of subject English classrooms in the UK is changing as a consequence of the use of technologies. Using the example of interactive white boards, Jewitt raises the question of an increasingly complex and rich semiotic classroom landscape that has an impact on the practices of interpreting information and making connections across the different modes and media at hand in the classroom.

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